

## Aeronautics

# Low-Noise Exit Guide Vanes

### for Turbofan Jet Engines

NASA's Langley Research Center has developed new noise-reducing guide vanes. Aircraft jet engine noise remains a major issue for airports, communities near airports, and of course for jet engine designers. NASA has developed a novel approach to mitigate the noise generated from exit guide vanes used in high-bypass-ratio turbofan engines. Exit guide vanes provide increased thrust and efficiency by controlling the swirl in the downstream engine flow generated by the turbofan. The interaction of this swirling flow with the stationary guide vanes, however, is a significant source of noise. Design of the vane shapes and placement have allowed for some reduction in the amount of noise generated. Sound-absorbing linings in the ducting are also used to reduce this turbofan noise as it passes through the engine nacelle. The NASA innovation described here, however, represents a novel design for the construction of the stationary exit guide vanes to reduce the noise at its source.

## BENEFITS

- ➔ Reduces noise of high-bypass turbofan engines typically used in commercial aviation today. Testing at realistic mach numbers to validate concept is scheduled
- ➔ Novel construction of the exit guide vanes minimizes noise produced through the interaction of the turbofan with the stationary exit guide vanes
- ➔ Mitigates turbofan/guide vane-induced noise at its source. Minimizes complex acoustical treatments via engine liners
- ➔ Can be used for metal and composite guide vane designs
- ➔ Should not affect the aerodynamic performance of the fan blades and guide vanes. The performance factor will be fully evaluated in the scheduled testing

technology solution

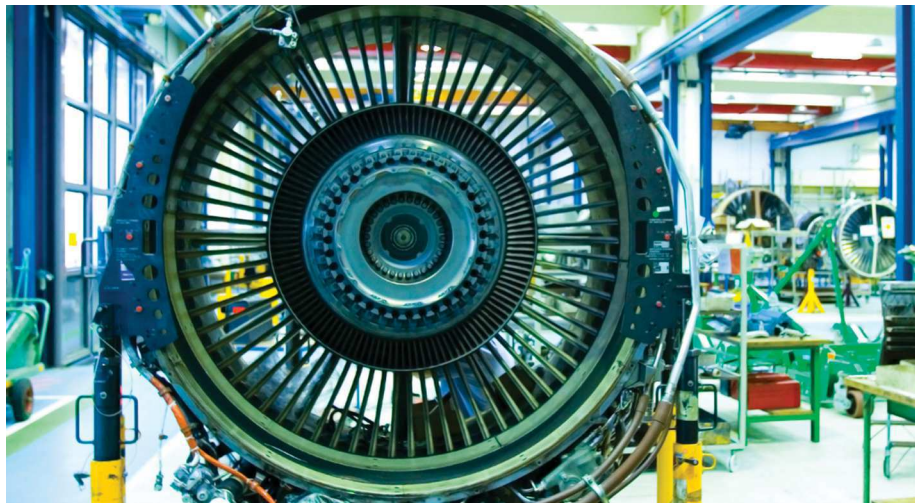


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## THE TECHNOLOGY

The guide vanes constructed under this innovation have a segmented outer shell with porous regions, which are connected to resonant chambers within the guide vane interior. The porous shell provides for communication of the acoustic/aerodynamic disturbances outside of the blade with the interior resonant chambers. The guide vane can contain a number of resonant chambers in order to mitigate noise generated over a range of selected frequencies. The technology is protected under US Patent #7,334,998.



Turbofan jet engine

## APPLICATIONS

The technology has several potential applications:

- ➡ The technology offers commercial opportunities within the civilian and defense aerospace markets for turbofan jet engines. Jet engine builders/designers as well as the parts suppliers can leverage this technology into next-generation aircraft jet engines to meet market demands for low-noise engine operation

## PUBLICATIONS

Patent No: 7,334,998

National Aeronautics and Space Administration

**The Technology Gateway**

**Langley Research Center**

Mail Stop 151

Hampton, VA 23681

757.864.1178

LARC-DL-technologygateway@mail.nasa.gov

<http://technology.nasa.gov/>

**www.nasa.gov**

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